Support for the Amendment

Specification paragraph **[0022]** provides support for the above amendment.

REMARKS

Valve apparatus claims 1, 2, and 4-10 remain in the application. Claim 1 has been amended to specify a seal isolating the actuating fluid from the fluid in the passages. For example, see the apparatus item indicated by reference numerals 28 in the drawing figures.

35 USC 103(a) Rejection of Claims 1, 6, 8, and 9 over Daido et al. US Patent No. 5,634.627 ("Daido") in view of Pearce et al. US Patent No. 5,676,342 ("Pearce") and Otto et al. US Patent No. 5,676,342 ("Otto").

The rejection relies on Daido's cartridge valve for the structural elements of the valve body having two passages, a 45 degree chamfered valve seat, a plunger, spring, seal, etc. but not showing the head contacting the retaining cap in valve open position; and not showing a vertical and an inclined passage geometry. Pearce is cited for a head contact with the retaining cap and Otto is cited for a vertical and an inclined passage. The rejection suggests the obviousness of the combination of the features of Otto and Pearce to the body of Daido.

Applicants respectfully traverse in view of the amended claim because (i) the combination of these valve features would not be obvious; (ii) because the references do not in fact show a vertical and inclined valve passage geometry providing reduced flow rate that in turn reduces particle delivery; and because (iii) neither the references nor their combination teach or suggest a pressure-actuated valve suitable for down hole use by sealing the passages from the actuating fluid, even when the valve is closed. In fact, the cited references never recognized this problem or its solution because they teach typical one direction flow valves for other applications, having piping into and out of the valve.

Daido

Daido teaches a gas-driven valve having bellows containing a vacuum, instead of seals. Daido is designed to avoid variations in internal pressure within the bellows due to ambient pressure so that the valve is useful in very cold environments. Daido's valve overcomes the problem of pipe length design for use in a vacuum tank by putting the valve entirely in the

vacuum tank. Daido never recognized the problems of down hole fluid cross flow (in either direction) from pressure imbalance between reservoirs.

Notably, Daido does not provide a vertical and inclined passage, that when used as input, reduces fluid flow rate thereby reducing particle delivery rate and particle size so as to reduce the likelihood of a particle lodging between the plunger and location 21 in the drawings. See especially the specification description at paragraph **[0023]**.

While it could be argued (but is not admitted) that the bellows of Daido function as a seal in their intended environment, there is no provision of a seal to isolate actuating fluid from reservoir fluid. In fact, it is not clear from Daido if the welded bellows would function as a seal over repeated operation in a down hole environment. Also, there is no motivation to modify the passage orientations of Daido since sediment or particulate interference is not at issue in the flow channels of Daido.

Pearce

Pearce teaches a pressure-actuated valve for single direction flow without concern for proppant or other particulate interference with the valve operation. Pearce does not recognize the problem of particulate interference with the valve closure and no vertical and inclined orientation is taught or suggested. Also, no seal between the actuating fluid and the external fluid was ever addressed because, like Daido, the valve of Pearce is designed to move fluid from and to an enclosed pipe so fluid sealing was never considered.

Otto

Otto is not a fluid-actuated valve so Otto never recognized the issue of fluid isolation to avoid contamination or interference. The Otto valve is designed to bleed fluid through a pin hole in diaphragm 17 so as to achieve a flow condition determined by a balance of the electrical input to the solenoid controlling sealing member 68 and the flow passage around valve seat 18 to vertical section 28 of outlet 16.

While Otto discloses a controlling fluid flow that moves from reservoir 64 through passageway 56 in main valve member 32, it is not clear that the fluid flow compartment is an incline passage geometry. Some of the fluid flow is from above the point where sealing member 68 closes against pilot valve seat 58. Also, contrary to the claim 1 feature, it appears there is still always an upward fluid pressure (more than negligible) from vertical section 28 through pilot passageway 56, on sealing member 68 tending to force the main valve flow open. In fact, Otto relies on this feature for operation of this gasoline mixing valve. Further, it does not appear that a particulate-laden fluid would be flowing up then down into passageway 56, if it could flow at all through small aperture 66 in diaphragm 17. It appears such a fluid might clog this valve's operation, even with increased electrical input.

The flow passages of Otto through which most of the fluid flows, is horizontally in one direction only from inlet 14 over valve seat 18 to outlet 16. The skilled artisan would be led to look at this horizontal flow of Otto, not the small portion of flow (decreasing flow) to control the movement of the valve member 32. Certainly there is no provision to exclude particles on closing of this valve since the diaphragm design might preclude such fluids in the first case.

As with the other references, there is no provision to isolate the working fluid (none in Otto--solenoid control) from the fluid in the passages 16 and 18. The skilled artisan would not be led to adapt features from this gasoline mixer to the vacuum tank valve of Daido to arrive at a pressure operated relief valve suitable for use in reservoirs of differing pressures.

Reconsideration and withdrawal of the rejection are respectfully requested.

35 USC 103(a) Rejection of Claim 2 over Daido et al. US Patent No. 5,634.627 ("Daido") in view of Pearce et al. US Patent No. 5,676,342 ("Pearce") and further in view of Greiner et al. US Patent No. 4,807,846 ("Greiner").

Greiner discloses a plastic bushing 40 which avoids the fuel flowing between the guide 36 and the bushing 40. The bushing surrounds the poles of this electrically actuated valve. How is the skilled artisan to take this bushing 40 fitted for an electrical activation device and convert it to a position in the pressure-operated valve of the invention? The bushing purpose in Greiner is

to prevent fluid flow but it is not clear that it would be effective to do so in the invention. The bushing of the invention serves as a shim adjustment to the valve operation. The selection of this item 44 to provide a bushing is not clear from this fuel injection device for operation in a down hole environment. Also, there is no disclosure of a vertical and inclined passage geometry to prohibit entrance of interfering particles on closing and to avoid opening pressure on the plunger.

Reconsideration and withdrawal of the rejection is respectfully requested.

35 USC 103(a) Rejection of Claims 3 (sic), 4, and 10 over Daido et al. US Patent No. 5,634.627 ("Daido") in view of Pearce et al. US Patent No. 5,676,342 ("Pearce") and further in view of Bey US Patent No. 4,335,744 ("Bey").

Bey discloses a multiple washer type spring in an air-actuated valve. While Belleville springs are generally known, there is nothing about the Bey use of such a spring that suggests it is usable for a reservoir application that may include a particulate-laden fluid. In any case, claims 4 and 10 depend on claim 1. The application of Pearce is not sound because there is no consideration of the isolation of fluids in the passages from the actuating fluid since Pearce's fluids are contained by pipes. Also, there is no provision of a solution to the fluid separation need. Bey, like the other references, deals with fluids already contained when entering and exiting the valve. Also, like Greiner, Bey does not disclose a vertical and inclined passage geometry.

Reconsideration and withdrawal of the rejection are respectfully requested.

35 USC 103(a) Rejection of Claims 5 and 7 over Daido et al. US Patent No. 5,634.627 ("Daido") in view of Pearce et al. US Patent No. 5,676,342 ("Pearce") and further in view of engineering expediency.

Regarding claim 5, while the skilled artisan would certainly try to minimize the gap between the plunger and the orifice, there is no suggestion in the art to provide the passage geometry of the invention to minimize particle travel upon closing of the valve, as discussed in the specification at paragraph **[0024]**. Accordingly, merely providing such tolerance is

inadequate without also providing the appropriate closure and passage geometry to be able to handle particulate-laden flows. Also, this reference too lacks any indication of sealing the reservoir fluid from the actuating fluid with seals outside the body because the flows are already contained in the pipes of Daido and Pearce.

Regarding claim 7, there is nothing to suggest to the skilled artisan to minimize the diameter decrease from the passage 22 to the seat 26 because the art did not recognize the issue of excluding particles from the closure pinch, as discussed in the specification at paragraph **[0025]**. Finally, like Greiner and Bey, no passage of inclined and vertical orientation is disclosed to avoid opening pressure on the plunger and to preclude particles upon closing.

Reconsideration and withdrawal of the rejections over engineering expediency are respectfully requested.

Allowance of claims 1, 2, and 4-10 and passage of the application to issuance is respectfully requested.

Respectfully submitted,

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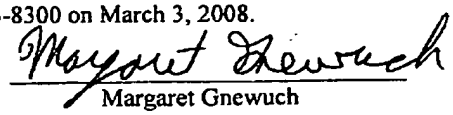

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